

## IN THE CLAIMS

The following is a complete listing of the claims, and replaces all earlier versions and listings. It is noted that the underlining in Claims 1 and 3-7 is permanent.

1. (Previously Presented) A method of turbocoding for the transmission of information in which, a first polynomial with binary coefficients  $g(x)$  of degree  $d$  and with a constant term equal to 1 having been predetermined, first the information is presented in the form of binary sequences  $\underline{u}$  of length

$$k = p - d,$$

where  $p$  is a predetermined multiple of a period  $N$  of the polynomial  $g(x)$ , and then, for each of the sequences  $\underline{u}$ , there is produced a triplet  $\underline{v}$  of binary sequences  $(\underline{a}, \underline{b}, \underline{c})$  intended to be transmitted and obtained as follows:

the sequence  $\underline{a}$  is of length  $p$  and obtained by extending the sequence  $\underline{u}$  by means of  $d$  padding bits so that the polynomial

$$a(x) = \sum_{i=0}^{p-1} a_i x^i$$

associated with  $\underline{a}$  is divisible by  $g(x)$ ,

the sequence  $\underline{b}$  is represented by the polynomial

$$b(x) = a(x) \cdot f_1(x) / g(x),$$

where  $f_1(x)$  is a second polynomial with predetermined binary coefficients, without a common divisor with  $g(x)$ , and

the sequence  $\underline{c}$  is represented by the polynomial

$$c(x) = a^*(x) \cdot f_2(x) / g^*(x),$$

where

$$a^*(x) = \sum_{i=0}^{p-1} a_i x^{\pi(i)},$$

where  $\pi(i)$  is a predetermined permutation of the integers  $i$  lying between 0 and  $(p-1)$ , where  $g^*(x)$  is a third polynomial with predetermined binary coefficients, of degree  $d$  and with a constant term equal to 1,  $\pi(i)$  and  $g^*(x)$  being chosen so that, whatever the polynomial  $a(x)$  divisible by  $g(x) \pmod{2}$ ,  $a^*(x)$  is divisible by  $g^*(x) \pmod{2}$ , and where  $f_2(x)$  is a fourth polynomial with predetermined binary coefficients, without a common divisor with  $g^*(x)$ , in which there is taken for  $\pi(i)$  the residue modulo  $p$  of the product  $(i \cdot e)$ , where  $e$  is a predetermined strictly positive integer, relatively prime with  $p$ , congruent with a power of 2 modulo  $N$ , and not congruent with a power of 2 modulo  $p$ , from which it results that  $g^*(x)$  is identical to  $g(x)$ .

2. (Previously Presented) A turbodecoding method, which makes it possible to decode received sequences which are decodable and which have been transmitted after having been coded by means of a turbocoding method according to Claim 1.

3. (Previously Presented) A method for determining a turbocoding method in which, a first polynomial with binary coefficients  $g(x)$  of degree  $d$  and with a constant term equal to 1 having been predetermined, first the information is presented in the form of binary sequences  $\underline{u}$  of length

$$k = p - d,$$

where  $p$  is a predetermined multiple of the period  $N$  of the polynomial  $g(x)$ , and then, for each of the sequences  $\underline{u}$ , there is produced a triplet  $\underline{v}$  of binary sequences  $(\underline{a}, \underline{b}, \underline{c})$  intended to be transmitted and obtained as follows:

the sequence  $\underline{a}$  is of length  $p$  and obtained by extending the sequence  $\underline{u}$  by means of  $d$  padding bits so that the polynomial

$$a(x) = \sum_{i=0}^{p-1} a_i x^i$$

associated with  $\underline{a}$  is divisible by  $g(x)$ ,

the sequence  $\underline{b}$  is represented by the polynomial

$$b(x) = a(x) \cdot f_1(x) / g(x),$$

where  $f_1(x)$  is a second polynomial with predetermined binary coefficients, without a common divisor with  $g(x)$ , and

the sequence  $\underline{c}$  is represented by the polynomial

$$c(x) = a^*(x) \cdot f_2(x) / g(x),$$

where

$$a^*(x) = \sum_{i=0}^{p-1} a_i x^{\pi(i)},$$

where  $f_2(x)$  is a third polynomial with predetermined binary coefficients, without a common divisor with  $g(x)$ , and where  $\pi(i)$  is the residue modulo  $p$  of the product  $(i \cdot e^*)$ , where  $e^*$  is a number determined in the following manner:

- a) a certain number of different sequences  $\underline{u}$  are chosen to form a representative set,
- b) for each strictly positive integer number  $e$  less than  $p$ , congruent with a power of 2 modulo  $N$  and relatively prime with  $p$ :

a total binary weight  $PB$  of all the triplets of binary sequences  $\underline{v}$  associated with the sequences  $\underline{u}$  belonging to the representative set is calculated, and note is taken of the value  $w(e)$ , associated with this value of  $e$ , of the minimum weight amongst all these binary weights  $PB$ , and

c) in order to implement the coding, the value  $e^*$  of  $e$  which is associated with the largest value of the minimum weight  $w$  is chosen.

4. (Previously Presented) A device for coding sequences of data intended to be transmitted by means of a turbocoding method according to Claim 1, having:

means for obtaining, for each sequence of data  $\underline{u}$ , said sequence  $\underline{a}$  associated with  $\underline{u}$  by extending the sequence  $\underline{u}$  by means of said  $d$  padding bits, and

at least one turbocoder having an interleaver  $\pi_1$  able to effect the permutation provided for in said method.

5. (Previously Presented) A decoding device intended to implement a turbodecoding method according to Claim 2, having:

at least one turbodecoder having two interleavers  $\pi_1$  able to effect the permutation provided for in said method, and a deinterleaver  $\pi_2$  able to reverse the permutation; and

means for producing a binary sequence  $\underline{\hat{u}}$  by removing the last  $d$  bits of the estimated sequence  $\underline{\hat{a}}$  obtained at the end of the turbodecoding of the received sequences  $\underline{a'}$ ,  $\underline{b'}$  and  $\underline{c'}$  corresponding respectively to the transmitted sequences  $\underline{a}$ ,  $\underline{b}$ , and  $\underline{c}$ .

6. (Previously Presented) An apparatus for transmitting coded digital signals, having a coding device according to Claim 4, and means for transmitting the coded sequences  $\underline{a}$ ,  $\underline{b}$ , and  $\underline{c}$ .

7. (Previously Presented) An apparatus for receiving coded digital signals, having a decoding device according to Claim 5, and means for receiving the sequences  $\underline{a'}$ ,  $\underline{b'}$ , and  $\underline{c'}$ .

8. (Previously Presented) A telecommunications network, having at least one apparatus according to Claim 6 or Claim 7.

9. (Previously Presented) A data storage means, which can be read by a computer or a microprocessor, storing instructions of a computer program, which makes it possible to implement a method according to any one of Claims 1 to 3.

10. (Previously Presented) Means of storing data which are removable, partially or totally, which can be read by a computer and/or a microprocessor, storing instructions of a computer program, which makes it possible to implement a method according to any one of Claims 1 to 3.

11. (Currently Amended) A physically-embodied, ~~executable~~ computer program in a form directly executable by a computer, containing instructions such that, when said program controls a programmable data processing device, the instructions cause the data processing device ~~implements~~ to implement a method according to any one of Claims 1 to 3.